

# An Algorithm of Smoking Stages Assessment in Adolescents: A Validation Study Using the Latent Class Analysis Model

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Date of Submission: April 13, 2012

Date of Acceptance: August 24, 2012

How to cite this article: Mohammadpoorasl A, Nedjat S, Yazdani K, Fakhari A, Rahimi Foroushani A, Fotouhi A. An algorithm of smoking stages assessment in adolescents: A validation study using the latent class analysis model. *Int J Prev Med* 2013;4:1204-11.

## ABSTRACT

**Background:** Notwithstanding the importance of smoking stages evaluation in adolescents, there is not an appropriate instrument for its measurement. This study aims to introduce an appropriate instrument for measurement of smoking stages in adolescents and to examine its validity using latent class analysis (LCA) model.

**Methods:** We designed an algorithm to measure the smoking stages. The relevancy and clarity of the algorithm was examined by experts and lay experts. We assessed the reliability of our algorithm using test-retest method. Moreover, using the LCA, we studied the validity of the stages measured by the designed algorithm in 4903 students (ages 14-19), who were randomly selected from grade 10 high school students in Tabriz (North-West of Iran).

**Results:** The algorithm content validity indicates high relevancy and clarity percentages. Intra-class correlation of 0.929 was found in the assessment of the reliability of smoking stages (9 stages) in 154 students within a two-week interval. The LCA model revealed nine interpretable classes ( $G^2 = 0.051$ ,  $df = 1$ ,  $P = 0.821$ ) for the measurement of smoking stages. Examination of the smoking cessation stages in a sample of 218 students in the cessation stage demonstrated that the results for five classes could be interpreted ( $G^2 = 0.001$ ,  $df = 1$ ,  $P = 0.975$ ).

**Conclusions:** The results suggested that this algorithm is clear, valid, and reliable.

**Keywords:** Adolescence, latent class analysis, reliability, smoking stages, validity

## INTRODUCTION

The age of smoking onset is decreasing in both developed and developing countries<sup>[1]</sup> and most of the developed countries have implemented several policies in order to reduce smoking rates, more specifically among adolescents. This is because the age at initiation of cigarette smoking is one of the important determinants of tobacco dependence possibility, likelihood of smoking cessation, and the risk of unwilling